WHAT IS CLAIMED IS:

1. A process for the selective trimerization of olefinic compounds under trimerization conditions in the presence of a catalyst system, said process is effected by using a catalyst system comprising:

A) a cyclopentadienyl titanium complex of formula

$(Cp\text{-}B(R)_nAr)TiR^1_3$

wherein

Cp is a cyclopentadienyl type ligand, cyclopentadienyl type ligand being substituted, and combination thereof,

B is a bridging group, based on a single atom selected from the groups 13 to 16 inclusive of the Periodic System,

Ar is a aromatic group, substituted aromatic group, and combinations thereof,

R is, independently, hydrogen, a hydrocarbon residue, hydrocarbon being substituted, hydrocarbon containing heteroatams, or groups R and B are joined together to form a ring,

n is an integer equal to the valency of B minus 2, and

R^1 is a mono-anionic group; and

B) an activator,

wherein said olefinic compounds are selected from a group consisting of C_2-C_{20} olefines and mixtures of two or more of these olefins.

2. The process according to claim 1, wherein said process is effected at a temperature from 20-150°C, at a pressure from 0.2 to 14 MPa, preferably 1.5 to 3 MPa.

3. The process according to claim 1, wherein the single atom of B is selected from the group consisting of B, C, N, O, Si, P and S.

4. The process according to claim 1 wherein

B is carbon or silicon;

Ar is phenyl, substituted phenyl, an aromatic entity, and combinations thereof;

R^1 is a halogen atom, mono-anionic hydrocarbon residue, mono-anionic hydrocarbon residue containing heteroatoms, and combinations thereof; and

n is 1 or 2, where n is 2, R is a mono-anionic hydrocarbon residue, mono-anionic hydrocarbon residue containing heteroatoms, and combinations thereof; and where n is 1, R is a di-anionic hydrocarbon residue, di-anionic hydrocarbon residue containing heteroatoms, and combinations thereof.

5. The process according to claim 1, wherein Cp is a cyclopentadienyl type ligand being substituted, besides said B-(R)n group, with 1 to 8 groups of formula -YR2R3R4 in which Y is C or Si and R2, R3 and R4 are, independently, H, halogen, lower alkyl, aryl, lower-alkyl-aryl, aryl-lower alkyl residue, wherein said alkyl and aryl are independently substituted or not with one or more lower alkyl residues, said alkyl and aryl residues being independently provided or not with at least one heteroatom, selected from halogen, nitrogen, oxygen, sulfur and phosphor.

6. The process according to claim 1, wherein said lower alkyl residues, being the same or different to each other, are linear or branched C_1-C_5 alkyl residues.

7. The process according to claim 1, wherein said aryl group in the alkylaryl or arylalkyl residue is a phenyl group.

8. The process according to claim 4, wherein said halogen is fluorine or chlorine.

9. The process according to claim 1, wherein
Ar is a phenyl group, substituted or not at the meta-or para-position;
B is based on a carbon atom;
n is 1 or 2, where n is 2, R is, independently, methyl, or ethyl; and where n is 1, R is $=CH_2$, or forms when R is C_4H_8 or C_5H_{10} together with group B a dianionic cyclic group;
Cp is C_5H_4 or $C_5H_3(SiMe_3)$, or $C_5H_3(CMe_2Ph)$; and
R^1 is chlorine, methyl, or benzyl.

10. The process according to claim 1, wherein said titanium complex is supported on a carrier.

11. The process according to claim 1, wherein said activator is methylalumoxane, a salt of a non-coordinating anion, or a Lewis acid capable of abstracting an anion from said transition metal complex.

12. The process according to claim 11 wherein the activator is methylalumoxane and the molar ratio of Ti:Al is from 1:100 to 1:1000.

13. The process according to claim 1 ,wherein said catalyst system further comprises a scavenger.

14. The process according to claim 13, wherein said scavenger is selected from the group consisting of i-Bu_3Al and $(i\text{-}Bu_2Al)_2O$.

15. A catalyst system for the selective trimerization of olefins, said catalyst system comprising:

A) a half-sandwich substituted cyclopentadienyl titanium complex of formula

$(Cp\text{-}B(R)_nAr)TiR^1_3$

wherein

Cp is a cyclopentadienyl type ligand, substituted cyclopentadienyl type ligand, and combinations thereof,

B is a bridging group, based on a single atom selected from the groups 13 to 16 inclusive of the Periodic System,

Ar is a aromatic group, substituted aromatic group,

R is, independently, hydrogen, a hydrocarbon residue, substituted hydrocarbon residue, or hydrocarbon containing heteroatoms, or groups R and B are joined together to form a ring,

n is an integer equal to the valency of B minus 2, and

R^1 is a mono-anionic group; and

b) an activator.

16. The catalyst system according to claim 15, wherein the single atom of B is selected from the group consisting of B, C, N, O, Si, P and S.

17. The catalyst system according to claim 15 wherein B is carbon or silicon;

Ar is phenyl, substituted phenyl or an aromatic entity, and combinations thereof;

R^1 is a halogen atom, mono-anionic hydrocarbon residue, mono-anionic hydrocarbon containing heteroatoms, and combinations thereof; and

n is 1 or 2, where n is 2, R is a mono-anionic hydrocarbon residue, mono-anionic hydrocarbon containing heteroatoms, and combinations thereof; and where n is 1, R is a di-anionic hydrocarbon residue, di-anionic hydrocarbon containing heteroatoms, and combinations thereof.

18. The catalyst system according to claim 15, wherein Cp is a cyclopentadienyl type ligand being substituted, besides said B-(R)n group, with 1 to 8 groups of formula -YR2R3R4 in which Y is C or Si and R2, R3 and R4 are, independently, H, halogen, lower alkyl, aryl, lower-alkyl-aryl, aryl-lower alkyl residue, wherein said alkyl and aryl are independently substituted or not with one or more lower alkyl residues, said alkyl and aryl residues being independently provided or not with at least one heteroatom, selected from halogen, nitrogen, oxygen, sulfur and phosphor.

19. The catalyst system according to claim 15, wherein said lower alkyl residues, being the same or different to each other, are linear or branched C_1-C_5 alkyl residues.

20. The catalyst system according to claim 15, wherein said aryl group in the alkylaryl or arylalkyl residue is a phenyl group.

21. The catalyst system according to claim 17 , wherein said halogen is fluorine or chlorine.

22. The catalyst system according to claim 15, wherein

Ar is a phenyl group, substituted or not at the meta-or para-position;

B is based on a carbon atom;

n is 1 or 2, where n is 2, R is, independently, methyl, or ethyl; and where n is 1, R is $=CH_2$, or forms when R is C_4H_8 or C_5H_{10} together with group B a dianionic cyclic group;

Cp is C_5H_4 or $C_5H_3(SiMe_3)$, or $C_5H_3(CMe_2Ph)$; and

R^1 is chlorine, methyl, or benzyl.

23. The catalyst system according to claim 15, wherein said titanium complex is supported on a carrier.

24. The catalyst system according to claim 15, wherein said activator is methylalumoxane, a salt of a non-coordinating anion, or a Lewis acid capable of abstracting an anion from said transition metal complex.

25. The catalyst system according to claim 24, wherein the activator is methylalumoxane and the molar ratio of Ti:Al is from 1:100 to 1:1000.

26. The catalyst system according to claim 15, wherein said catalyst system further comprises a scavenger.

27. The catalyst system according to claim 26, wherein said scavenger is selected from the group consisting of *i*-Bu_3Al and $(i\text{-}Bu_2Al)_2O$.